B.E. Semester–VIII

Choice Based Credit Grading Scheme with Holistic Student Development. (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

B.E. Semester –VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

<table>
<tr><td colspan="5">BE Information Technology</td><td colspan="4">B.E (SEM : VIII)</td></tr>
<tr><td colspan="5">Course Name: Data Science</td><td colspan="4">Course Code: PCC- IT 801</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td>Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>OR</td><td>TW</td><td rowspan="2">150</td></tr>
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<tr><td colspan="9">IA: In-Semester Assessment- Paper Duration – 1.5 Hours
ESE : End Semester Examination- Paper Duration - 3 Hours
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).</td></tr>
<tr><td colspan="9">Prerequisite: Database Management System, Data warehousing and Mining</td></tr>
</table>

Course Objective: The course intends to deliver the fundamental of Data Science for data analysis, learn cutting edge tools and techniques for data analysis, Machine Learning Algorithms and Learn business decision making and Data Visualization.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Provide Insights about the Roles of a Data Scientist and enable to analyze the Big Data	L1, L2,L3
2	Demonstrate knowledge of statistical and exploratory data analysis data analysis techniques utilized in decision making.	L1,L2,L3,L4
3	Apply principles of Data Science to the analysis of business problems.	L1,L2,L3,L4
4	Use Machine Learning Algorithms to solve real-world problems.	L1,L2,L3,L4
5	Understand advanced data analytical methods	L1,L2,L3,L4
6	Provide data science solution to business problems and visualization.	L1,L2,L3,L4,L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**An Introduction to Data Science** Definition, working, benefits and uses of Data Science, Data science vs BI, The data science process, Role of a Data Scientist	**04**	L1, L2,L3
2	**Statistical Data Analysis & Inference** Populations and samples, Statistical modelling, probability distributions, fittings a model, Statistical methods for evaluation, Exploratory Data Analysis	**08**	L1,L2,L3
3	**Machine Learning Algorithms and Usage in Applications** k-nearest neighbor, Simple and multiple Linear Regression, Logistic Regression, Support vector machine, Model-Based Clustering, Clustering High-Dimensional Data, Case studies of usage of algorithms in different applications.	**12**	L1,L2,L3,L4
4	**Data Visualization** Data Visualization basics, techniques, types, applications, tools, Data Journalism, Interactive dashboards	**08**	L1,L2,L3,L4
5	**Advance Analytical Methods** Text Analysis- Text analysis steps, A text analysis example, Collecting raw text and representing text, TF and TFIDF, Categorizing documents by topics, determining sentiments, Time series analytics- overview, ARIMA model,	**08**	L1,L2,L3,L4
6	**Business problems and data science solutions** Data Science and Business Strategy: Thinking Data- Analytically, Competitive Advantage with Data Science, Data Science Case Studies, Recommender systems ,Case Study: Global Innovation Network and Analysis	**05**	L1,L2,L3,L4,L5
	Total Hr.	**45**	

List of Practical's/Experiments:

Practical No.	Type of Experiment	Tutorial/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic experiment**	Implementation of data pre-processing algorithms on any database	3	L1, L2,L3,L4
2		Implementation of basis statistics using R tool	3	L1, L2,L3,L4
3	**Design Experiment**	Develop a code for k-Nearest Neighbours and analyse it.	2	L1, L2,L3,L4,L5
4		Develop a code for linear regression and analyse it.	2	L1, L2,L3,L4,L5

5		Develop a code for clustering algorithm.	2	L1, L2,L3,L4,L5
6		Demonstrate visualization tool like Tableau for Business domain	3	L1, L2,L3,L4,L5
7		Demonstrate visualization tool like Tableau for healthcare domain	3	L1, L2,L3,L4,L5
8	**Case study**	Case study on Text Analysis	2	L1, L2,L3
9		R tool for data analytics science ,usage of algorithms in different applications	2	L1, L2,L3
10	**Mini Project**	Mini project on Business problems and emerging data science solutions	8	L1, L2,L3,L4,L5,L6
		Total Hrs.	**30**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Doing Data Science	Rachel Shutts and Cathy O'Neil	O Reilly	2nd	2014
2	Data Science for business	F. Provost, T Fawcett,	Wiley India	2nd	2013
3	Data Mining Concepts and Techniques	Jiawei Han, Micheline Kamber	Morgan Kaufmann	3rd	2012
4	James, G., Witten, D., Hastie, T., Tibshirani, R.	An introduction to statistical learning with applications in R	Springer	--	2013

Online Recourses:

S. No.	Website Name	URL	Modules covered
12.	www.geeksforgeeks.org	https://www.geeksforgeeks.org/introduction-data-science-skills-required/	M1
13.	www.tutorialspoint.com	https://www.tutorialspoint.com/python_with_data_science/index.asp	M1,M2, M4
14.	www.w3schools.in	https://www.w3schools.in/python-data-science/	M1-M3,M5

B.E. Semester – VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

BE Information Technology							**B.E (SEM : VIII)**		
Course Name: Blockchain Technologies							**Course Code:** PEC-IT 8011		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
3	-	2@	5	4	25	75	25	25	**150**

IA: In-Semester Assessment- Paper Duration – 1.5 Hours
ESE : End Semester Examination- Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)
@ Capstone Project

Prerequisite: Substantial programming experience, software engineering

Course Objective: The course intends to deliver understanding of fundamentals of blockchain, list the concepts and blockchain technologies that can be used in application development

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	Understand the components of blockchain and cryptocurrencies	L1,L2
2	Describe the concepts, technology and applications of Blockchain to be applied in the application	L1,L2
3	Distinguish and apply different consensus algorithm as per the requirement of application	L1,L2,L3
4	Get acquainted with different crypto currencies and their characteristics	L1,L2,L3,L4
5	Apply blockchain technology thinking to improve on existing products in IT	L1,L2,L3,L4,L5,L6
6	Design, build, and deploy a distributed application	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basics of Blockchain** Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance ,Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.	7	L1,L2
2	**Distributed Ledger Technology** Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof, Digital Trust, Asset, Transactions,Distributed Ledger Technology,Types of network Components of blockchain or DLT,Ledger Blocks,Blockchain,PKI and Cryptography,Private keys,Public keys, Hashing , Digital Signature	8	L1,L2
3	**Distributed Consensus** Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate	8	L1,L2,L3,L4
4	**Cryptocurrency:** Currency ,Double Spending, Cryptocurrenc, P2P Payment Gateway,Wallet, Mining,public blockchain and private blockchain,Other Crypt currencies	7	L1,L2,L3,L4
5	**Ethereum and DAPPs** Ethereum network , EVM ,Transaction fee ,Mist , Ether, gas , Solidity, Smart contracts ,Truffle ,Web3, Design and issue Cryptocurrency , Mining , DApps , DAO	7	L1,L2,L3,L4,L5, L6
6	**Hyperledger Fabric** Introduction to Hyperledger , What is Hyperledger , Why Hyperledger ,Where can Hyperledger be used , Hyperledger Architecture , Membership , Blockchain ,Transaction , Chaincode , Hyperledger Fabric ,Features of Hyperledger	8	L1,L2,L3,L4,L5, L6
	Total Hours	**45**	

Capstone Project Guide Lines

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.

3. The students may do survey for different application which they can apply blockchain .

4. Students will do Installation, configuration and also try for Cross platform Integrated Development Environment

5. Students will try to Design and implement following points in their Mini Project
   a) Front end
   b) Middleware
   c) Backend (Blockchain)

6. Each group along with the concerned faculty shall identify a potential problem statement for project development, on which the study and implementation is to be conducted.

7. Each group may present their work in various project competitions and paper presentations.

8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Capstone Project Hours Distribution:

Sr. No.	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study Research papers, articles, mini project title Identification	4	L1, L2
2	Project Title finalization and development of Modules	2	L1, L2
3	Design methodology and tools for implementation	4	L1, L2
4	Implementation of Modules phase 1	4	L1, L2, L3
5	Result Phase I	2	L1, L2, L3, L4
6	Implementation of Modules Phase 2	4	L1, L2, L3
7	Result Phase II	2	L1, L2, L3, L4
8	Testing	2	L1, L2, L3, L4
9	Result validation	2	L1, L2, L3, L4, L5
10	Report Writing	4	L1, L2
	Total Hours	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Bitcoin and cryptocurrency technologies: a comprehensive introduction.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder	Princeton University Press, 2016.	Second	2016
2	Mastering Bitcoin	Andreas Antonopoulos	O'REILLY	First	2014
3	Mastering Blockchain	Imran Bashir	Packt Publishing	First	2017

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.coursera.org	https://www.coursera.org/learn/blockchain-professionals	M1,M2,M3,
2	https://www.coursera.org	https://www.coursera.org/learn/smarter-contracts	M1.M2,M3
3	https://www.coursera.org	https://www.coursera.org/learn/blockchain-foundations-and-use-cases	M1.M2,M3
4	https://www.dappuniversity.com	https://www.dappuniversity.com/articles/the-ultimate-ethereum-dapp-tutorial	M4,M5
5	://www.hyperledger.org	https://www.hyperledger.org/use/fabric	M6
6	https://www.tutorialspoint.com	https://www.tutorialspoint.com/blockchain/index.htm	M4,M5,M6
7	https://www.guru99.com	https://www.guru99.com/blockchain-tutorial.html	M1,M2,M5,M6
8	https://www.javatpoint.com/	https://www.javatpoint.com/blockchain-tutorial	M1,M2,M5,M6
9	https://ghostvolt.com	https://ghostvolt.com/articles/blockchain_intro.html	M1,M2,M3,M4,M6
10	https://hackr.io/	https://hackr.io/blog/blockchain-programming-beginners-guide	M4,M5,M6

B.E. Semester – VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

<table>
<tr><td colspan="7">BE Information Technology</td><td colspan="3">B.E (SEM : VIII)</td></tr>
<tr><td colspan="7">Course Name: Natural Language Processing</td><td colspan="3">Course Code: PEC IT 8012</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
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@ Capstone Project</td></tr>
<tr><td colspan="10">Prerequisite: Programming Language Basic, Machine Learning.</td></tr>
</table>

Course Objective: : Course should be able to deliver fundamental knowledge of Natural Language Processing and applying knowledge to implement real time problems in fields of natural languages.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand field of natural language processing.	L1, L2
2	Analyze capabilities and limitations of current natural language technologies,	L1, L2, L3, L4
3	Apply the model linguistic phenomena with formal grammars.	L1, L2, L3, L4
4	Analyze and test algorithms for NLP problems & mathematical and linguistic foundations underlying approaches to the various areas in NLP	L1, L2, L3, L4
5	Understanding the concept of deep learning for NLP	L1, L2
6	Apply NLP techniques to design real world NLP applications such as text categorization, text summarization, information extraction	L1, L2,L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Natural Language Processing** History of NLP, Generic NLP system, levels of NLP, Knowledge in language processing, Ambiguity in Natural language , stages in NLP, challenges of NLP.	8	L1, L2
2	**Word Level Analysis** Morphology analysis –survey of English Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST) , Morphological parsing with FST, Lexicon free FST Porter stemmer. N –Grams- N-gram language model, N-gram for spelling correction.	7	L1, L2, L3, L4
3	**Syntax Analysis** Part-Of-Speech tagging (POS)- Tag set for English (Penn Treebank) , Rule based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence labeling: Hidden Markov Model (HMM), Maximum Entropy, and Conditional Random Field (CRF).	7	L1, L2, L3, L4
4	**Semantic Analysis** Lexical Semantics, Attachment for fragment of English- sentences, noun phrases, Verb phrases, prepositional phrases, Relations among lexemes & their senses –Homonymy, Polysemy, Synonymy, Hyponymy, WordNet, Robust Word Sense Disambiguation (WSD) ,Dictionary based approach ,Pragmatics	8	L1, L2, L3, L4
5	**Natural Language processing with deep learning** Introduction to deep learning, Neural network models for language understanding tasks, Machine translation, use of tool like tensor flow	7	
6	**Applications and recent trends in NLP** Information retrieval, Question answers system, categorization, text summarization, sentiment analysis, Named Entity Recognition, spam filter speech recognition.	8	L1, L2,L3
Total Hours		**45**	

Capstone Project Guide Lines

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.

3. The students may do survey for different application which they can create project using various tool of NLP.

4. Students will do Installation, configuration of Natural Language tool kit (NLTK) or any other tool which is required tool for their project work.

5. Students will try to Design and implement following points in their Mini Project (Natural Language Processing)
   a) Implementing a pre-trained model
   b) Deploying the model as an API
   c) Connecting the API to your main application
   d) Write a Python script to serve up predictions.
   e) Write a configuration file to define your deployment.

6. Each group along with the concerned faculty shall identify a potential problem statement for NLP applications, on which the study and implementation is to be conducted.

7. Each group may present their work in various project competitions and paper presentations.

8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Capstone Project Hours Distribution:

Sr. No.	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study Research papers, articles, mini project title Identification	4	L1, L2
2	Project Title finalization and development of Modules	2	L1, L2
3	Design methodology and tools for implementation	4	L1, L2
4	Implementation of Modules phase 1	4	L1, L2, L3
5	Result Phase I	2	L1, L2, L3, L4
6	Implementation of Modules Phase 2	4	L1, L2, L3
7	Result Phase II	2	L1, L2, L3, L4
8	Testing	2	L1, L2, L3, L4
9	Result validation	2	L1, L2, L3, L4, L5
10	Report Writing	4	L1, L2
	Total Hours	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Speech and Language Processing	Daniel Jurafsky, James H. Martin	Prentice Hall	Third Edition	2008
2	Foundations of Statistical Natural Language Processing	Christopher D.Manning and Hinrich Schutze,	MIT Press, 1999	Second Edition	1999
3	Natural Language Processing and Information Retrieval	Siddiqui and Tiwary U.S	, Oxford University Press	--	2008
4	Multilingual natural language processing applications‖	Daniel M Bikel and Imed Zitouni —	Peasron	--	2013
5	Natural Language Processing with Python	Steven Bird, Ewan Klein,	O'Reilly	--	--

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	www.geeksforgeeks.org	https://www.geeksforgeeks.org/fundamentals-of-algorithms/#AnalysisofAlgorithms	M1-M6
2	www.tutorialspoint.com	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm	M1-M3, M6
3	www.w3schools.in	https://www.w3schools.in/category/data-structures-tutorial/	M1, M4

B.E. Semester – VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

BE Information Technology								B.E (SEM : VIII)	
Course Name: Storage Area Network								**Course Code: PEC IT 8013**	
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
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IA: In-Semester Assessment- Paper Duration – 1.5 Hours
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The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)
@ Capstone Project

Prerequisite: Computer Network and Database Management

Course Objective: To evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS. Define backup, recovery, disaster recovery, business continuity, and replication. Examine emerging technologies including IP-SAN. Understand logical and physical components of a storage infrastructure. Identify components of managing and monitoring the data center. Define information security and identify different storage virtualization technologies.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Analyse the limitations of the client-server architecture and evaluate the need for data protection and storage centric architectures such as Intelligent storage system.	L1,L2
2	Understand, interpret and examine various SAN technologies.	L1,L2,L3,L4
3	Describe and sketch the SAN architecture and its uses.	L1,L2,L3,L4
4	Classify the applications as per their requirements and select relevant SAN solutions.	L1,L2,L3,L4,L5,L6
5	Understand and evaluate different SAN management strategies to fulfill business continuity requirements.	L1,L2,L3,L4,L5,L6
6	Design case studies on NAS, SAN and SAN/ NAS	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Information Storage Technology** Review data creation and the amount of data being created and understand the value of data to a business, Challenges in Data Storage and Management, Data Storage Infrastructure.	7	L1,L2
2	**Network Attached Storage, Storage on Network** NAS hardware and software architecture, NAS connectivity, NAS as a Storage System; NAS Hardware devices; NAS software components; NAS connectivity options: NAS connectivity hardware and Software Architecture.	7	L1,L2,L3,L4
3	**Storage Area Networks Architecture Overview** Creating Network for storage; Hardware devices: Fibre Channel Switch, Host Bus Adaptors, Putting the Storage in SANs, Fabric Operation from a hardware perspective, SAN hardware considerations ; Software Components: The switches operating system, device drivers, the supporting components, considerations for SAN software ; Configuration options for SANs: Connecting into the data center, the evolving network and device connections, SAN configuration guidelines	10	L1,L2,L3,,L4
4	**Storage Virtualization** Forms, Taxonomy, Configuration, Challenges, Types of Storage Virtualizations.	7	L1,L2,L3,L4,L5, L6
5	**Management Planning business continuity** Defining the environment, the role of storage networking in business continuity, storage design and implementation of the business continuity planning ; Managing availability: Availability Metrics, Implementing the plan ; Maintaining Serviceability: Tracking the configurations, Investigating the changes and closing the loop on serviceability; Capacity Planning: Storage Analysis, developing and implementing plan for storage, Modelling performance and capacity requirements ; Security considerations: Overview of Information security, Security methods, Storage Security challenges, FC SAN security, NAS security	9	L1,L2,L3,L4,L5, L6
6	**Storage Security and Management** Security Framework, Storage security domains, List and analyzes the common threats in each domain, Security Implementations. Case studies on NAS, SAN, SAN/NAS.	5	L1,L2,L3,L4,L5, L6
	Total Hours	**45**	

Capstone Project Guide Lines

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.

3. The students may do survey for different application which they can create Apps using Android.

4. Students will do Installation, configuration of Android Studio & to create AVD and also try for Cross platform Integrated Development Environment (Any Open Source Tool).

5. Students will try to Design and implement following points in their Mini Project (Android Apps)
   a) Widget box for Android phone.
   b) Use Layouts
   c) Use Intents
   d) Use Activity
   e) Use SQLite
   f) Use Camera
   g) Use Location API
   h) Generate APK file

6. Each group along with the concerned faculty shall identify a potential problem statement for Apps development, on which the study and implementation is to be conducted.

7. Each group may present their work in various project competitions and paper presentations.

8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Capstone Project Hours Distribution:

Sr. No.	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study Research papers, articles, mini project title Identification	4	L1, L2
2	Project Title finalization and development of Modules	2	L1, L2
3	Design methodology and tools for implementation	4	L1, L2
4	Implementation of Modules phase 1	4	L1, L2, L3
5	Result Phase I	2	L1, L2, L3, L4
6	Implementation of Modules Phase 2	4	L1, L2, L3
7	Result Phase II	2	L1, L2, L3, L4
8	Testing	2	L1, L2, L3, L4
9	Result validation	2	L1, L2, L3, L4, L5
10	Report Writing	4	L1, L2
	Total Hours	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs	Richard Barker, Paul Massiglia	Wiley	Second	2008
2	Storage Networks Explained	Ulf Troppens,Wolfgang Muller-Friedt,Rainer Wolafka	Wiley Publication	Sixth	1999
3	Information Storage and Management	G. Somasundaram, Alok Shrivastava	EMC Education services, Wiley Publication	First	2009

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	NPTEL	https://www.youtube.com/watch?v=fFxpSmyICwI	M1,M2,M3, M4,M5,M6
2	Pathshala	https://www.youtube.com/watch?v=T0g-GAFtXNY	M1,M2
3	EMC2	www.emc.org	M1,M2,M3,M4,M5, M6

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<table>
<tr><td colspan="7">BE Information Technology</td><td colspan="4">B.E (SEM : VIII)</td></tr>
<tr><td colspan="7">Course Name: Enterprise Resource Planning</td><td colspan="4">Course Code: PEC IT 8014</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="6">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="6">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>2@</td><td>5</td><td>4</td><td>25</td><td>75</td><td>--</td><td>--</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment- Paper Duration – 1.5 Hours
ESE : End Semester Examination- Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)
@ Capstone Project</td></tr>
<tr><td colspan="10">Prerequisite: Basics of Software Knowledge</td></tr>
</table>

Course Objective: This course presents an introduction to ERP and related technologies. The course discusses ERP Manufacturing Perspective and ERP modules. The course will teach the learners the ERP implementation lifecycle, emphasis on ERP benefits and introduces the ERP tools.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand the basic concepts of ERP.	L1,L2
2	Identify different technologies used in ERP.	L1,L2,L3,L4
3	Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules.	L1,L2,L3,L4
4	Discuss the benefits of ERP	L1,L2,L3,L4
5	Understand and implement the ERP life cycle.	L1,L2,L3,L4,L5,L6
6	Apply different tools used in ERP.	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to ERP** Concept of ERP, Origin, Evolution of ERP, Conceptual Model of ERP, The Structure of ERP, Need of ERP, Advantages and Disadvantages of ERP, Functions of ERP, Overview of available ERP Packages and Tools. NIT Raipur	4	L1,L2
2	**ERP Related Technology and Manufacturing Perspective** BPR-Business Processing Reengineering, Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), SCM-Supply Chain Management, CRM-Customer Relationship Management, MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System	8	L1,L2,L3,L4
3	**ERP Manufacturing Perspective and ERP Modules** MRP - Material Requirement Planning, BOM - Bill Of Material, MRP -Manufacturing Resource Planning, DRP - Distributed Requirement Planning, PDM - Product Data Management Finance, Plant Maintenance, Quality Management, Materials Management	10	L1,L2,L3,,L4
4	**Benefits of ERP** Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality, Costs, Improved Information Accuracy and Design-making Capability	5	L1,L2,L3,L4
5	**ERP Implementation Lifecycle** Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-user Training, Post- implementation (Maintenance mode)	6	L1,L2,L3,L4,L5, L6
6	**E-commerce and E-business** E-Business structural transformation, Flexible Business Design, Customer Experience, Create the new techo enterprise, New generation e-business leaders, memo to CEO, Empower your customer, Integrate Sales and Service, Integrated Enterprise applications. Enterprise resource planning the E-business Backbone Enterprise architecture, planning, ERP usage in Real world, ERP Implementation, Future of ERP applications, memo to CEO ,EProcurement, E- Governance, Developing the E-Business Design. JD Edwards-Enterprise One Microsoft Dynamics-CRM Module	12	L1,L2,L3,L4,L5, L6
	Total Hours	**45**	

Capstone Project Guide Lines

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.

3. The students may do survey for different application which they can create Website (Enterprise or E-commerce)

4. Students will do Installation, configuration of softwares which required to implement websites (Any Open Source Tool).

5. Students will try to Design and implement following points in their Mini Project (Website)
   a) Widget box for Android phone.
   b) Use Layouts
   c) Use Intents
   d) Use Activity
   e) Use Database
   f) Use Camera
   g) Use Location API
   h) Host website

6. Each group along with the concerned faculty shall identify a potential problem statement for Website development, on which the study and implementation is to be conducted.

7. Each group may present their work in various project competitions and paper presentations.

8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Capstone Project Hours Distribution:

Sr. No.	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study Research papers, articles, mini project title Identification	4	L1, L2
2	Project Title finalization and development of Modules	2	L1, L2
3	Design methodology and tools for implementation	4	L1, L2
4	Implementation of Modules phase 1	4	L1, L2, L3
5	Result Phase I	2	L1, L2, L3, L4
6	Implementation of Modules Phase 2	4	L1, L2, L3
7	Result Phase II	2	L1, L2, L3, L4
8	Testing	2	L1, L2, L3, L4
9	Result validation	2	L1, L2, L3, L4, L5
10	Report Writing	4	L1, L2
	Total Hours	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Enterprise Resource Planning	Alexis Leon,	Tata McGraw Hill.	Reprint	2008
2	Enterprise Resource Planning	Diversified by Alexis Leon	TMH		2009
3	Enterprise Resource Planning	Ravi Shankar & S. Jaiswal	Galgotia	First	1999
4	Guide to Planning ERP Application	Annetta Clewwto and Dane Franklin	McGRaw-Hill	First	1997
5	The SAP R/3 Handbook	Jose Antonio	McGraw – Hill		
6	E-Business Network Resource planning using SAP R/3 Baan and Peoplesoft : A Practical Roadmap For Success	By Dr. Ravi Kalakota			

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.coursera.org	https://www.coursera.org/lecture/enterprise-systems/1-1b-introduction-to-enterprise-resource-planning-erp-LneSo	M1,M2,M3
2	https://www.coursera.org	https://www.coursera.org/lecture/advanced-manufacturing-enterprise/enterprise-resource-planning-erp-MAUTK	M1,M2,M3
3	https://www.tutorialspoint.com	https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm	M1,M2,M3,M4,M5, M6
4	https://www.guru99.com	https://www.guru99.com/erp-full-form.html	M1,M2,M3,M4,M5, M6
5	http://www.academictutorials.com	http://www.academictutorials.com/erp/erp-introduction.asp	M1,M2,M3,M4,M5, M6

B.E. Semester – VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

<table>
<tr><td colspan="8">B.E .Information Technology</td><td colspan="4">B.E. (SEM: VII)</td></tr>
<tr><td colspan="8">Course Name: Genetic Algorithm</td><td colspan="4">Course Code: PEC-IT 8015</td></tr>
<tr><td colspan="8">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="8">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="8">Hours Per Week</td><td>Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td colspan="2">Tutorial</td><td>Practical</td><td colspan="2">Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>OR</td><td>TW</td><td rowspan="2">150</td></tr>
<tr><td>3</td><td colspan="2">-</td><td>2@</td><td colspan="2">5</td><td>4</td><td>25</td><td>75</td><td>25</td><td>25</td></tr>
<tr><td colspan="12">IA: In-Semester Assessment- Paper Duration - 1.5Hours
ESE: End Semester Examination - Paper Duration - 3 Hours
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%)
Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).
@ Capstone Project</td></tr>
<tr><td colspan="12">Prerequisite: Fundamentals of Programming and Basic Algorithms.</td></tr>
</table>

Course Objective: The course intends to deliver the fundamentals of the principles underlying Evolutionary Computation in general and Genetic Algorithms in particular.

Course Outcomes: Upon completion of the course, student will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Explain the of the principles underlying Evolutionary Computation in general and Genetic Algorithms in particular.	L1, L2
2	Apply Evolutionary Computation Methods to find solutions to complex problems.	L1, L2, L3,L4,L5
3	Analyze and experiment with parameter choices in the use of Evolutionary Computation.	L2, L3,L4,L5
4	Summarize Genetic Programming techniques in Genetic Algorithms and Evolutionary Computing.	L2, L3,L4, L5
5	Ability to appreciate the importance of optimizations and its use in computer engineering fields and other domains.	L2,L3,L4, L5
6	Use the Genetic Algorithm to solve real world problems	L2,L3,L4, L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Evolutionary Computation** Introduction and Overview Biological and artificial evolution, Evolutionary computation and AI, Search spaces and fitness landscapes, elements of genetic algorithms, a simple genetic algorithm , genetic algorithms and traditional search methods how do genetic algorithms work?	**06**	L1, L2
2	**Genetic Algorithms in Problem Solving** **Genetic Algorithm** -Representation, operators, and standard algorithm. The building block hypothesis and the schema theorem **Evolving computer programs**- lisp program, cellular automata **Data analysis and prediction**- predicting dynamical systems, predicting protein structure **Evolving neural networks**- evolving weights in a fixed network, evolving network architectures, direct encoding, grammatical encoding, evolving a learning rule	**09**	L1,L2,L3,L4,L5
3	**Mathematical Foundations of Genetic Algorithm** Schemas and Two-Armed and k-armed problem, royal roads, exact mathematical models of simple genetic algorithms, Statistical- Mechanics Approaches. When should a genetic algorithm be used? Encoding a problem for a genetic algorithm, adapting the encoding, selection methods genetic operators, parameters for genetic algorithms	**08**	
4	**Genetic Programming** Trees as individuals, Major steps of genetic programming, e.g., functional and terminal sets, initialization, crossover, mutation, fitness evaluation, etc. Search operators on trees, Automatically defined functions, Issues in genetic programming, e.g., bloat, scalability, etc., Examples	**08**	L2,L3,L4,L5
5	**Swarm intelligence and Multi - objective Evolutionary Optimization** Particle swarm optimization, Ant colony optimization, Artificial bee colony algorithm, cuckoo search. Pareto optimality, Multi - objective evolutionary algorithms. Modularity and regularity in evolution. The scaling problem and the curse of dimensionality. Evolvability. Module acquisition. Developmental models. Compositional and hierarchical approaches.	**07**	L2,L3,L4,L5
6	**Applications of Genetic Algorithms** Optimization problems and its types , Economics, Neural Networks, Parallelization ,Image Processing, Vehicle routing problems, Scheduling applications, Machine Learning, Robot Trajectory Generation, Parametric Design of Aircraft , DNA Analysis, Multimodal Optimization	**07**	L2,L3,L4,L5
	Total Hours	**45**	

Capstone Project Guide Lines:

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject In charge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.
3. The students may do survey for different application which they can create application using any programming language.
4. Students will try to Design and implement in their Mini Project
6. Each group along with the concerned faculty shall identify a potential problem statement for Apps development, on which the study and implementation is to be conducted.
7. Each group may present their work in various project competitions and paper presentations.
8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Capstone Project Hours Distribution:

Sr. No	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study article/ research paper & identification of project title.	4	L1, L2,L3
2	Finalizing title and identification of project modules.	4	L1,L2,L3,L4,L5
3	Design & Methodology	2	L2,L3,L4,L5
4	Implementation of modules phase I	4	L2,L3,L4,L5
5	Result & discussion of phase I	4	L2,L3,L4,L5
6	Implementation of modules phase II	4	L2,L3,L4,L5
7	Result of phase II and validation of modules	4	L1,L2,L3,L4,L5
8	Report writing	4	L1,L2,L3,L5
	Total hours	**30**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Genetic Algorithms, in search, optimization and Machine learning.	David E. Goldberg,	Pearson	First	1989
2.	Evolutionary Computation: A Unified Approach	Kenneth A. DeJong.	MIT Press	First	2006
3.	An introduction to genetic algorithms	Melanle Mitchell,	PHI.	Second	2003

Online References:

Sr. No.	Website Name	URL	Modules covered
1	www.tutorialspoint.com	https://www.tutorialspoint.com/genetic_algorithms/genetic_algorithms_introduction.htm	M1-M5
2	www.genetic-programming.com	http://www.genetic-programming.com/	M4, M5, M6
3	www.javatpoint.com	https://www.javatpoint.com/artificial-neural-network-genetic-algorithm	M1-M6
4	www.obitko.com	https://www.obitko.com/tutorials/genetic-algorithms/	M1-M6

B.E. Semester –VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="6">BE Information Technology</td><td colspan="4">B.E. Open Elective SEM : VIII</td></tr>
<tr><td colspan="6">Course Name: Project Management</td><td colspan="4">Course Code : OEC IT- 8011</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5" rowspan="2">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
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<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">ISA: In-Semester Assessment - Paper Duration – 1 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)</td></tr>
<tr><td colspan="10">Prerequisite: Data Structure, Software Engineering</td></tr>
</table>

Course Objective: The objective of the course is to familiarize the students with the use of a structured methodology/approach for each and every unique project undertaken, including utilizing project management concepts, tools and techniques and appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

Course Outcomes: Upon completion of the course students will be able to:

Sr No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Apply selection criteria and select an appropriate project from different options	L1, L2, L3, L4
2	Write work break down structure for a project and develop a schedule based on it	L1, L2, L3, L4
3	Identify opportunities and threats to the project and decide an approach to deal with them strategically.	L1, L2, L3, L4
4	Use Earned value technique and determine & predict status of the project.	L1, L2, L3, L4
5	Compare and contrast various project execution, Monitoring and Controlling Projects, Project Contracting, Project Leadership and Ethics and Closing the Project	L1, L2, L3, L4
6	Capture lessons learned during project phases and document them for future reference	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Project Management Foundation** Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical) Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Project management in various organization structures, PM knowledge areas as per Project Management Institute (PMI).	6	L1, L2, L3, L4
2	**Initiating Projects** How to get a project started, Selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter; Project proposal. Effective project team, Stages of team development & growth (forming, storming, norming &performing), team dynamics	6	L1, L2, L3, L4
3	**Project Planning and Scheduling** Work Breakdown structure (WBS) and linear responsibility chart, Interface Co-ordination and concurrent engineering, Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques. PERT, CPM, GANTT chart, Introduction to Project Management Information System (PMIS).	8	L1, L2, L3, L4
4	**Planning Projects** Crashing project time, Resource loading and levelling, Goldratt's critical chain, Project Stakeholders and Communication plan Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks	8	L1, L2, L3, L4
5	**Executing Projects, Monitoring and Controlling Projects & Project Contracting** 5.1 Executing Projects: Planning monitoring and controlling cycle, Information needs and reporting, engaging with all stakeholders of the projects, Team management, communication and project meetings 5.2 Monitoring and Controlling Projects: Earned Value Management techniques for measuring value of work completed; Using milestones for measurement; change requests and scope creep, Project audit. 5.3 Project Contracting : Project procurement management, contracting and outsourcing,	10	L1, L2, L3, L4
6	**Project Leadership and Ethics & Closing the Project** 6.1 Project Leadership and Ethics: Introduction to project leadership, ethics in projects, Multicultural and virtual projects 6.2 Closing the Project: Customer acceptance; Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report; doing a lessons learned analysis; acknowledging successes and failures; Project management templates and other resources; Managing without authority; Areas of further study.	7	L1, L2
	Total Hours	**45**	

Books and References:

S.No	Title	Authors	Publisher	Edition	Year
1	Project Management Foundation:	Project Management: A managerial approach, Jack Meredith & Samuel Mantel.	Wiley India	Seventh Edition	2009
2	Initiating Projects & Project Planning and Scheduling	A Guide to the Project Management Body of Knowledge (PMBOK® Guide)	Project Management Institute PA, USA	Fifth Edition	--

3	Planning Projects	Project Management, Gido Clements	Cengage Learning	First	--
4	Executing Projects, Monitoring and Controlling Projects & Project Contracting	Project Management, Gopalan Wiley India	Wiley India	First	--
5	Project Leadership and Ethics & Closing the Project	Project Management, Dennis Lock.	Gower Publishing England	Ninth Edition	--

Online Resources:

S. No.	Website Name	URL	Modules Covered
1	http://www.opentextbooks.org.hk	http://www.opentextbooks.org.hk/system/files/export/15/15694/pdf/Project_Management_15694.pdf	M1-M6
2	https://www.nesacenter.org	https://www.nesacenter.org/uploaded/conferences/SEC/2014/handouts/Rick_Detwiler/15_Detwiler_Resources.pdf	M1-M3, M6
3	http://www.edo.ca	http://www.edo.ca/downloads/project-management.pdf	M1,M4

B.E. Semester –VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="7">BE Information Technology</td><td colspan="4">BE Open Elective (SEM: VIII)</td></tr>
<tr><td colspan="7">Course Name: Energy Audit and Management</td><td colspan="4">Course Code: OEC IT- 8012</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="6">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="6">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration – 1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)</td></tr>
<tr><td colspan="10">Prerequisite: - Knowledge of Basic Electrical and Mechanical Systems</td></tr>
</table>

Course objectives:

1. To understand the importance energy security for sustainable development and the fundamentals of energy conservation.
2. To introduce performance evaluation criteria of various electrical and thermal installations to facilitate the energy management
3. To relate the data collected during performance evaluation of systems for identification of energy saving opportunities.

Course outcomes: After successful completion of the course student will be able:-

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To identify and describe present state of energy security and its importance.	L1
2	To identify and describe the basic principles and methodologies adopted in energy audit of any utility.	L1, L2, L3
3	To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.	L1, L2, L3, L4
4	To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities	L1, L2, L3, L4
5	To analyze the data collected during performance evaluation and recommend energy saving measures	L1, L2, L3
6	To understand the concept of Energy conservation measures in building complex	L1

Detailed Syllabus

Module No.	Unit No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1		**Energy Scenario & Energy Conservation measures**	06	L1
	1.1	Present Energy Scenario		
	1.2	Renewable and Non-Renewable form of Energy		
	1.3	Greenhouse Gas effect, Acid Rain, Energy Pricing, Energy Sector Reforms,		
	1.4	Energy Conservation and its Importance: Energy Conservation Act-2001 and its features. Role of Bureau of Energy Efficiency (BEE), Energy Security, Basic idea of Material and Energy balance		
2		**Energy Audit & Energy Economics**	08	L1, L2, L3
	2.1	Energy Audit: Definition, need, types of energy audit, Steps of detailed Energy Audit, Role of Energy Manager and Internal audit Team,		
	2.2	Measuring instruments & Equipment used during Energy audit		
	2.3	Understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement,		
	2.4	Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution		
	2.5	Elements of monitoring & targeting, Data and information analysis.		
	2.6	Energy Economics: Simple payback period (SPP), Net Present value (NPV), Return on investment (ROI), Internal rate of return (IRR)		
3		**Energy Management in Electrical System**	10	L1, L2, L3, L4
	3.1	Electricity billing, Basic concept of Electrical load management, Maximum demand Control, Energy management through Power factor improvement		
	3.2	Energy efficient equipment and appliances, Star ratings of Electrical Equipment.		
	3.3	Lighting System control: Occupancy sensors, daylight integration, and use of intelligent controllers. Energy efficiency measures in lighting system		
	3.4	Energy conservation opportunities in water pumps, industrial drives, induction motors, soft starters, variable speed drives.		
4		**Energy Management in Thermal Systems**	10	L1. L2, L3,L4
	4.1	Review of different thermal loads, Steam System: Basic idea of Steam distribution system, Assessment of steam distribution losses, Steam leakages, Steam trapping, Condensate and flash steam recovery system, Energy conservation in Steam distribution system,		
	4.2	Boiler System: General fuel conservation measures in Boilers and furnaces, Waste heat recovery, cogeneration, use of insulation- types and application.		
	4.3	HVAC system: Coefficient of performance, Capacity, factors affecting performance of Refrigeration and Air Conditioning system performance, Energy savings opportunities in HVAC system.		

5		**Energy Performance Assessment**	**06**	**L1, L2, L3,**
	5.1	Performance assessment of Motors, variable speed drive, pumps,		
	5.2	Lighting System calculations: Installed Load Efficacy Ratio (ILER) method,		
	5.3	HVAC system calculations; various terms used in assessment of performance		
6		**Energy conservation in Residential and Commercial Buildings**	**05**	**L1**
	6.1	Energy Conservation Building Codes (ECBC)		
	6.2	Green Building norms, LEED ratings of buildings, Use of renewable energy sources in building complex		
		Total	**45**	

Books of Reference

SN	Title	Authors	Publisher
1.	Handbook of Electrical Installation Practice	Geofry Stokes	Blackwell Science
2.	Designing with light: Lighting System Handbook	By Anil Valia	-
3.	Energy Management handbook	W.C. Turner	John Wiley and Sons
4.	Handbook on Energy Audits and Management	A. K. Tyagi,	Tata Energy Research Institute (TERI).
5.	Energy Management Principles	C.B. Smith	Pergamon Press
6.	Energy Conservation Guidebook	Dale R. Patrick, S. Fardo, Ray E. Richardson	Fairmont Press
7.	Handbook of Energy Audits	Albert Thumann, W. J. Younger, T. Niehus	CRC Press

Online Reference

SNo.	Website Name	URL	Modules Covered
1	Bureau of Energy Efficiency	https://beeindia.gov.in/content/energy-auditors	1-2
2	You tube	https://youtube/7hDyLuFJ0c8	1-6
3	You tube	https://www.youtube.com/watch?v=UhGZRoUlr8U	1-6
4	NPTEL by IIT Roorkee	https://www.youtube.com/watch?v=2zWt-pBCU2I	1-3

B.E. Semester –VIII

Choice Based Credit Grading Scheme with Holistic Multidisciplinary Education -(CBCGS-H 2020) TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

BE Information Technology							**B.E. Open Elective SEM VIII**		
Course Name : Innovation Management							**Course Code :** OEC IT- 8013		
Contact Hours Per Week : 3							**Credits** : 3		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral / (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	**100**
IA: Mid Semester Assessment- Paper Duration – **1.5 hr** **ESE:** End Semester Evaluation-Paper Duration-**3 hrs.** Mid Semester Assessment for Term work will be on continues basis									
Prerequisite: Financial Accounting and Management and Business Modelling.									

Course Objective: The course intends to apply the concept of Innovation in Business.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Able to analyze and apply impact of innovation on society	L1,L2,L4
2	Able to understand the role of technology in creating wealth	L1,L2,L3
3	Recognize markers of business models which appear as a response to digital revolution	L1,L2,L3,L4
4	Search for real cases which represent new business models	L1,L2,L3,L4
5	Identify similar and distinguished features of business build on identical business models	L1,L2,L3,L4
6	Know the most important cases of data-driven business founded on new business models	L2,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
01	**Sources of Innovation** **Sources of Innovation:** Innovation / wealth creation process, three critical trajectories impacting the innovation process creative transformations, the importance of technological Innovation, The impact of technological innovation on society. Case study on impact of technological innovation on society. Industry dynamics of technological innovation, transcending creativity into innovation, innovation as a collaborative effort.	08	L1,L2,L4
02	**Types and patterns of innovation** **Types and patterns of innovation**: Technology S curves, formulation of technological innovation strategy, implementing technological innovation strategies. Managing new product development. Case study on new product development.	06	L1,L2,L3
03	**Collaboration strategies and Choosing innovative projects** **Collaboration Strategies:** The role of technology in the creation of wealth, historical perspective, long-wave cycle, evolution of production technology, technology and national economy. Case study on Collaboration Strategies. **Choosing innovative projects:** Management of technology, the conceptual frame work, technology and society, knowledge and technology, technology and business. Case study on How to choose innovative projects.	08	L1,L2,L3,L4
04	**Introduction to Business Models** What is a Business Model? Importance of Business Model. History of Business Model. Type of Business Model	8	L1,L2,L3,L4
05	**Business models as a key concept of strategic management.** Variety of business model frameworks: Canvas, 'Zott-Amit' model, BM navigator, 4W approach, Hybrid business models. Resource-based view (RBV). Industrial organization.	8	L1,L2,L3,L4
06	**Digital business models.** E-commerce. Innovative business model in retail and consumer goods. Omnichannel retail. Manufacturing business models. Digital manufacturing. Developers as new decision makers. Case-study of Apple, Android, Tinkoff.	7	L2,,L4,
	Total	**45**	

Books and References:

Sr. No	Title of the book	Authors	Publisher	Edition	Year
1	Strategic management of technological Innovation	Melissa A. Schilling	McGraw-Hill	Fifth Edition	2017
2	Management of technology	Tarek M. Khalil	McGraw Hill	Second Edition	2009
3	Business model generation: a handbook for visionaries, game changers, and challengers.	Osterwalder, A., &Pigneur, Y.	John Wiley & Sons	ThirdEdition	2010
4	Value creation in e-business.	Amit, R., &Zott, C.	Strategic management journal,	22(6-7), 493-520.	2001

Online Reference

Sr	Website Name	URL	Modules Covered
1.	Ideaconnection.com	https://www.ideaconnection.com/innovation-videos/	M1,M2
2.	Ideaconnection.com	https://www.ideaconnection.com/innovation-videos/	M3,M4
3.	Ideaconnection.com	https://www.ideaconnection.com/innovation-videos/	M5,M6
4.	https://nptel.ac.in	https://nptel.ac.in/courses/110/107/110107094/	M1,M2,M3,M4,M5, M6
5.	Coursera.org	https://www.coursera.org/learn/digital-business-models/lecture/nJTB0/lesson-4-asymmetric-business-models-creating-unfair-advantage	M4,M5,M6
6.	online.stanford.edu	https://online.stanford.edu/courses/xine249-building-business-models	M1,M2,M3,M4,M5, M6

B.E. Semester –VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
Proposed Syllabus under Autonomy Scheme (w.e.f. A.Y. 2020-21)

BE Information Technology							**BE Open Elective SEM:** VIII		
Course Name : Environmental Management							**Course Code:** OEC IT- 8014		
Contact Hours Per Week : 03							**Credits** : 03		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**100**
3	_	_	3	3	25	75	–	_	
ISA: Internal Assessment - Paper Duration – 1.5 Hour **ESE: End Semester Examination - Paper Duration - 3 Hours** **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)									
Prerequisite: Fundamentals of Chemistry and biology									

Course Objective: The course intends to give an understanding of environmental issues relevant to India and global concerns, the concept of ecology and familiarize the learner with environment related legislations.

Course Outcomes: Upon completion of the course student will be able to:

S. No	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand the concept of environmental management and the Energy scenario.	L1 L2
2	Understand ecosystem and interdependence, food chain etc.	L1 L2
3	Understand and interpret environment related legislations	L1 L2 L3 L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of Attainment as per Bloom's Taxonomy
1	**Introduction and Definition of Environment** Significance of Environment Management for contemporary managers, Career opportunities, Environmental issues relevant to India, Sustainable Development, the Energy scenario.	8	L1 L2
2	**Global Environmental concerns** Global Warming, Acid Rain, Ozone Depletion, Hazardous Wastes, Endangered life-species, Loss of Biodiversity, Industrial/Man-made disasters, Atomic/Biomedical hazards, etc.	8	L1 L2
3	**Concepts of Ecology** Ecosystems and interdependence between living organisms, habitats, limiting factors, carrying capacity, food chain, etc.	8	L1 L2
4	**Scope of Environment Management** Role and functions of Government as a planning and regulating agency Environment Quality Management and Corporate Environmental Responsibility.	8	L1 L2 L3 L4
5	**Total Quality Environmental Management** ISO-14000, EMS certification.	8	L1 L2 L3 L4

6	**General overview of major legislations** Environment Protection Act, Air (P & CP) Act, Water (P & CP) Act, Wildlife Protection Act, Forest Act, Factories Act, etc.	5	L1 L2 L3
	Total	39	

Books and References:

Sr.No.	Title	Author	Publisher	Edition	Year
1	Environmental Management: Principles and Practice	C J Barrow	Routledge Publishers	1st	1999
2	A Handbook of Environmental Management	John C. Lovett and David G. Ockwell	Edward Elgar Publishing	----------	2010
3	Environmental Management	V Ramachandra and Vijay Kulkarni	TERI Press	1st	2006
4	Indian Standard Environmental Management Systems — Requirements With Guidance For Use	Bureau Of Indian Standards	----------	----------	2005
5	Environmental Management: An Indian Perspective	S N Chary and Vinod Vyasulu	Macmillan India	----------	2000
6	Introduction to Environmental Management	Mary K Theodore and Louise Theodore	CRC Press	----------	2009
7	Environment and Ecology	Majid Hussain	Access Publishing	3rd	2015

Online References:

Sr. No.	Website Name	URL
1	Alison	https://alison.com/course/introduction-to-ecology
2	ISO	https://www.iso.org/iso-14001-environmental-management.html
3	Certified Environment Law Analyst	https://www.vskills.in/certification/legal/environment-law-certification

B.E. Semester –VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
Proposed Syllabus under Autonomy Scheme (w.e.f. A.Y. 2020-21)

BE Information Technology							**B.E. Open Elective SEM: VIII**		
Course Name: IPR and Patenting							**Course Code:** OEC IT- 8015		
Teaching Scheme (Program Specific)					**Examination scheme**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: Internal Assessment - Paper Duration – **1.5 Hours** **ESE:** End Semester Examination - Paper Duration - **3 Hours** **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of practical (40%) and Attendance (20%)									

Course Objective:

1. To understand intellectual property rights protection system
2. To promote the knowledge of Intellectual Property Laws of India as well as International treaty procedures
3. To get acquaintance with Patent search and patent filing procedure and applications

Course Outcome

SN	**Course Outcomes**	**Cognitive Levels as per Blooms Taxonomy**
1	understand Intellectual Property assets	L1,L2
2	Assist individuals and organizations in capacity building	L1,L2,L3
3	Work for development, promotion, protection, compliance, and enforcement of Intellectual Property and Patenting	L1,L2,L3

Detailed Syllabus :

Module No.	**Topics**	**Hrs**	**Cognitive Levels as per Blooms Taxonomy**
1	**Introduction to Intellectual Property Rights (IPR)**: Meaning of IPR, Different category of IPR instruments - Patents, Trademarks, Copyrights, Industrial Designs, Plant variety protection, Geographical indications, Transfer of technology etc. **Importance of IPR in Modern Global Economic Environment:** Theories of IPR, Philosophical aspects of IPR laws, Need for IPR, IPR as an instrument of development	5	L1,L2
2	**Enforcement of Intellectual Property Rights:** Introduction, Magnitude of problem, Factors that create and sustain counterfeiting/piracy, International agreements, International organizations (e.g. WIPO, WTO) active in IPR enforcement **Indian Scenario of IPR:** Introduction, History of IPR in India, Overview of IP laws in India, Indian IPR, Administrative Machinery, Major international treaties signed by India, Procedure for submitting patent and Enforcement of IPR at national level etc.	7	L1,L2,L3

3	**Emerging Issues in IPR:** Challenges for IP in digital economy, e-commerce, human genome, biodiversity and traditional knowledge etc.	8	L1,L2,L3
4	**Basics of Patents:** Definition of Patents, Conditions of patentability, Patentable and non-patentable inventions, Types of patent applications (e.g. Patent of addition etc),Process Patent and Product Patent, Precautions while patenting, Patent specification Patent claims, Disclosures and non-disclosures, Patent rights and infringement, Method of getting a patent	8	L1,L2,L3
5	**Patent Rules:** Indian patent act, European scenario, US scenario, Australia scenario, Japan scenario, Chinese scenario, Multilateral treaties where India is a member (TRIPS agreement, Paris convention etc.)	8	L1,L2
6	**Procedure for Filing a Patent (National and International):** Legislation and Salient Features, Patent Search, Drafting and Filing Patent Applications, Processing of patent, Patent Litigation, Patent Publication etc, Time frame and cost, Patent Licensing, Patent Infringement **Patent databases:** Important websites, Searching international databases	9	L1,L2,L3
	Total Hours	45	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Patent system and related issues at a glance	Keayla B K	National Working Group	First	2004
2	The enforcement of Intellactual Property Rights	Lous Harns	Wipo	3rd	2018

BE SEMESTER VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
Proposed Syllabus under Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="5">BE Information Technology</td><td colspan="4">B.E. Open Elective SEM: VIII</td></tr>
<tr><td colspan="5">Course Name: Supply Change Management</td><td colspan="4">Course Code: OEC- IT 8016</td></tr>
<tr><td colspan="4">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="4">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="4">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (20)</td><td>Term Work (20)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/ OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="9">IA: In-Semester Assessment- Paper Duration-1.5 Hours
ESE : End Semester Examination - Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance (20%)</td></tr>
<tr><td colspan="9">Prerequisite: NILL</td></tr>
</table>

Course Objective:

1. To acquaint with key drivers of supply chain performance and their inter-relationships with strategy.
2. To impart analytical and problem-solving skills necessary to develop solutions for a variety of supply chain management & design problems.
3. To study the complexity of inter-firm and intra-firm coordination in implementing programs such as e-collaboration, quick response, jointly managed inventories, and strategic alliances.

Course Outcome:

SN	Course Outcomes	Cognitive Levels as per Bloom's Taxonomy
1	To acquaint with key drivers of supply chain performance and their inter-relationships with strategy.	L1,L2,L3
2	To impart analytical and problem-solving skills necessary to develop solutions for a variety of supply chain management & design problems.	L1,L3,L4
3	To study the complexity of inter-firm and intra-firm coordination in implementing programs such as e-collaboration, quick response, jointly managed inventories and strategic alliances.	L1,L2,L4

Syllabus:

Module	Detailed Contents	Hours	Cognitive Levels as per Bloom's Taxonomy
01	**Building a Strategic Framework to Analyze Supply Chains** Supply chain stages and decision phases, Process view of supply chain: Supply chain flows, Examples of supply chains, Competitive and supply chain strategies, Achieving strategic fit: Expanding strategic scope, Drivers of supply chain performance. Framework for structuring drivers: inventory, transportation facilities, information obstacles to achieving fit.	06	L1,L2,L3
02	**Designing the Supply Chain Network** Distribution Networking: Role, Design, Supply Chain Network(SCN):Role, Factors, Framework for design decisions.	07	L1,L3,L4
03	**Materials Management** Scope, Importance, Classification of materials, Procurement, Purchasing policies, Vendor development and evaluation. Inventory control systems of stock replenishment, Cost elements, EOQ and its derivative modules.	08	L1,L2,L3
04	**Dimensions of Logistics** Introduction: A Macro and Micro Dimensions, Logistics interfaces with other areas, Approach to analyzing logistics system, Logistics and systems analyzing: Techniques of logistics system analysis, factors affecting the cost and Importance of logistics.	08	L1,L3,L4
05	**Warehouse and Transport Management** Concept of strategic storage, Warehouse functionality, Warehouse operating principles, Developing warehouse resources, Material handling and packaging in warehouses, Transportation Management, Transport functionality and principles, Transport infrastructure, transport economics and Pricing. Transport decision making.	07	L1,L2,L3
06	**IT in Supply Chain** 6.1 IT framework, Customer Relationship Management (CRM),internal Supply chain management, Supplier Relationship Management (SRM) and Transaction Management. Coordination in a Supply Chain 6.2 Lack of supply chain coordination and the Bullwhip effect, Obstacle to Coordination, Managerial levers, Building partnerships and trust. Emerging Trends and Issues 6.3 Vendor managed inventory-3PL-4PL, Reverse logistics: Reasons, Role, Activities; RFID systems: Components, Applications, Implementation; Lean supply chain, Implementation of Six Sigma in supply chain, Green supply chain.	09	L1,L3,L4
Total		45	

Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	Supply Chain Management Strategy, Planning, and operations	Sunil Chopra and Peter Meindl	Pearson	6th Edition	2016
2	Designing & Managing Supply chain	David Simchi Levi, Philip Kaminsky&	McGraw Hill	3rd Edition	2007

		Edith Smichi Levi			
3	Supply Chain Redesign: Transforming Supply Chains into Integrated Value Systems,	Robert B Handfield, Ernest L Nicholas	Prentice Hall	--	2002
4	The Management of Business Logistics: A Supply Chain Perspective	Coyle, Bardi, Langley	Thomson learning	--	2003
5	Supply chain management: for global competitiveness	B S Sahay	Macmillan	--	1999

Online Resources:

Sr. No.	Website Name	URL	Modules covered
1.	https://nptel.ac.in	https://nptel.ac.in/courses/110/106/110106045/	2
2.	? https://nptel.ac.in	https://nptel.ac.in/courses/110/107/110107074/	3
3.	https://www.scmhub.com	https://www.scmhub.com/courses/BBA	2
4.	https://www.udemy.com	https://www.udemy.com/topic/supply-chain/	4

B.E. Semester –VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

BE Information Technology							B.E. Open Elective SEM: VIII		
Course Name: Managerial Economics							Course Code: OEC- IT 8021		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (20)	Term Work (20)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR/ OR	TW	
3	-	-	3	3	25	75	-	-	100
IA: In-Semester Assessment- Paper Duration-1.5 Hours ESE : End Semester Examination - Paper Duration - 3 Hours									
Prerequisite: Financial Accounting									

Course Objective: By the end of the course, students will be able to understand both the theory and practice of Managerial Economics, the students will be in a position to appreciate the finer nuances of the subject, and this subject will help the students in applying the knowledge so acquired in policy planning and managerial decision making.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive Levels as per Bloom's Taxonomy
1	Analyze and apply the theory and practice of Managerial Economics	L1,L2,L3,L4
2	Understand the need to locate various factors affecting demand of products and plan marketing & business strategies accordingly. Also they will develop an understanding of the practical application of law of demand.	L1,L2,L3,L4
3	Understand the analytics of supply and demand and its various uses.	L1,L2,L3,L4,L5
4	Understand the holistic approach of production economy.	L1,L2,L3,L4,L5
5	Learn about the intricacies of the various market forms and their impact on the economy and business.	L1,L2,L3,L4,L5
6	Realize the importance of the different methods of capital budgeting as a tool of project management.	L1,L2,L3,L4,L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive Levels as per Bloom's Taxonomy
1	**Introduction to Managerial Economics**	5	L1,L2,L3,L4
	The meaning, scope and methods of Managerial Economics, Dominic Salvatore model of application of Economics to business decision making. Scarcity, choice & production possibility curve.		
2	**Consumer Behavior**	11	L1,L2,L3,L4
	Demand, types of demand, factors affecting demand & demand function. Making of linear demand function & linear demand curve. Law of demand. Consumer's surplus. Concept of elasticity of demand and its significance for a businessman. Types of Elasticity – Price Elasticity of Demand, Income Elasticity of Demand, Cross elasticity of demand & Promotional Elasticity of Demand, Demand forecasting – features, significance & methods.		
3	**Production Function**	5	L1,L2,L3,L4, L5
	Concept, Isoquant & Iso-cost analysis. Laws of returns to scale, economies & diseconomies of scale. Revenue Analysis, Cost analysis and break even analysis		
4	**Supply**	7	L1,L2,L3,L4, L5
	Concept of supply, factors affecting supply& the law of supply Determination of equilibrium price: effects of changes in demand & supply on equilibrium price.		
5	**Types of markets**	9	L1,L2,L3,L4, L5
	Perfect competition, monopoly, oligopoly & monopolistic competition – features and price determination. Pricing practices: Factors affecting pricing decision. Marginal cost pricing, mark up pricing, transfer pricing, product line pricing, price skimming and penetration price.		
6	**Profit Management**	8	L1,L2,L3,L4, L5
	• Profit management • Role of profits in a market economy • Nature and measurement of profit, profit policies • The hypothesis of profit maximization and its alternatives. Demand for capital • Supply of capital • Capital Rationing • Capital Budgeting, Net Present Value (NPV), Internal Rate of Return (IRR). • Appraising - the profitability of projects		
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Managerial Economics in a Global Economy	Dominick Salvatore	Oxford University Press	Seventh	2011
2	Managerial Economics	Suma Damodaran	Oxford University Press	Second	2010
3	Microeconomics for Business	Satya P Das	SAGE	First	2007
4	Economics	Paul Samuelson and Richard Nordhaus	MIT Press 1998.	FIRST	1998
5	Managerial Economics	Milton Spencer and Louis Siegelman	Palala Press	Second	2015
6	Managerial Economics: Concepts and Cases	Mote, Paul and Gupta	Princeton, 2010	First	2010

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	NPTEL.ac.in	https://nptel.ac.in/courses/110/101/110101005/	M1,M2,M3,M4,M5, M6
2	Udemy.com	https://www.udemy.com/course/introduction-to-managerial-economics/	M1,M2,M3,M4,M5, M6
3	Swayam.ac.in	https://onlinecourses.swayam2.ac.in/imb19_mg16/preview	M1,M2,M3,M4,M5, M6
4	Harvard.edu	https://online-learning.harvard.edu/course/managerial-economics?delta=0	M1,M2,M3,M4,M5, M6
5	Courseera.org	https://www.coursera.org/courses?query=managerial%20economics	M1,M2,M3,M4,M5, M6

B.E. Semester –VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

BE Information Technology							B.E. Open Elective SEM: VIII		
Course Name: Digital Business Management							Course Code: OEC-IT 8022		
Teaching Scheme (Program Specific)					Examination scheme				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR	TW	100
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment- Paper Duration-1.5 Hours ESE : End Semester Examination - Paper Duration - 3 Hours									
Prerequisite: Digital Marketing									

Course Objective: Students will be learn about intellectual property rights protection system, promote the knowledge of Intellectual Property Laws of India as well as International treaty procedures and get acquaintance with Patent search and patent filing procedure and applications

Course Outcome: Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive Levels as per Blooms Taxonomy
1	understand Human Resource Management	L1,L2
2	assist Organization of Personnel Functions	L1,L2,L3
3	work for Manpower Planning	L1,L2,L3
4	work for Motivating Employees	L1,L2,L3
5	work for Performance Appraisal Systems and Training	L1,L2,L3
6	work for Development Organisation Development	L1,L2,L3

Detailed Syllabus :

Module No.	Topics	Hrs	Cognitive Levels as per Blooms Taxonomy
1	**Introduction to Digital Business-** 1.1Introduction, Background and current status, E-market places, structures, mechanisms, economics and impacts Difference between physical economy and digital economy,. 1.**2Drivers of digital business**- Big Data & Analytics, Mobile, Cloud Computing, Social media, BYOD, and Internet of Things(digitally intelligent machines/services) 1.3opportunities and Challenges in Digital Business,	8	L1,L2
2	**Overview of E-Commerce** **2.1Overview of E-Commerce** E-Commerce- Meaning, Retailing in e-commerce-products and services, consumer behavior, market research and advertisement	9	L1,L2,L3

	B2B-E-commerce-selling and buying in private e-markets, public B2B exchanges and support services, e-supply chains, Collaborative Commerce, Intra business ECand Corporate portals **2.2Other E-C models and applications**, innovative EC System-From E-governmentand learning to C2C, mobile commerce and pervasive computing EC Strategy and Implementation-EC strategy and global EC, Economics and Justification of EC, 2.3**Using Affiliate marketing to promote your e-commerce business,** Launching a successful online business and EC project, Legal, Ethics and Societal impacts of EC		
3	**Digital Business Support services** **3.1Digital Business Support services**: ERP as e –business backbone, knowledgeTope Apps, Information and referral system **3.2Application Development**: Building Digital business Applications and Infrastructure	7	L1,L2,L3
4	**Managing E-Business** 4.1Managing E-Business-Managing Knowledge, Management skills for e-business, 4.2Managing Risks in e –business Security Threats to e-business -Security Overview, Electronic Commerce Threats,Encryption, Cryptography, Public Key and Private Key Cryptography, Digital Signatures, Digital Certificates, Security Protocols over Public Networks: HTTP,SSL, Firewall as Security Control, Public Key Infrastructure (PKI) for Security, Prominent Cryptographic Applications	8	L1,L2,L3
5	**E-Business Strategy-** 5.1E-Business Strategy-E-business Strategic formulation- Analysis of Company's Internal and external environment, Selection of strategy. 5.2E-business strategy into Action, challenges and E-Transition (Process of Digital Transformation)	8	L1,L2,L3
6	**Materializing e-business** 6.1Materializing e-business: From Idea to Realization-Business plan preparation 6.2Case Studies and presentations	5	L1,L2,L3

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	A textbook on E-commerce	Er Arunrajan Mishra, Dr W K Sarwade	Neha Publishers & Distributors	First Edition	2011
2	E-commerce from vision to fulfilment	Elias M. Awad,	PHI-Restricted,	First Edition	2002
3	Digital Business and E-Commerce Management	Ed, Dave Chaffey,	Pearson,	2nd Edition	August 2014
4	Introduction to E-business-Management and Strategy,	Colin Combe,	ELSVIER	2nd Edition	2006
5	Digital Business Concepts and Strategy,	Eloise Coupey	Pearson	2nd Edition,	2009
6	Trend and Challenges in Digital Business Innovation,	VinocenzoMorabito,	Springer	-	-

7	Digital Business	Discourse Erika Darics	Palgrave Macmillan		April 2015
8	E-Governance-Challenges and Opportunities in	Proceedings in 2 nd International Conference theory and practice of Electronic Governance	Oxford Publications	First Edition	-
9	Perspectives the Digital Enterprise –	A framework for Transformation, TCS consulting journal Vol.5		First Edition	-
10	Measuring Digital Economy-	A new perspective -	DOI:10.1787/97892 64221796-enOECD Publishing	First Edition	-

B.E. Semester –VIII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

BE Information Technology					B.E. Open Elective SEM: VIII				
Course Name: Social Network Analysis					Course Code: OEC-IT 8023				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR/OR	TW	
3	-	-	3	3	25	75	-	-	100
IA: In-Semester Assessment - Paper Duration – 1.5 Hours ESE: End Semester Examination - Paper Duration - 3 Hours									
Prerequisite: Algorithm, Programming									

Course Objective:

The Objective of this course is to deliver the fundamental concepts of theory of computation describing formal mathematical models of computation such as FA,PDA,LBA and TM by comparing their power, limitations, languages and their applications in computation and complexity theory and also to learn that not all problems are solvable by computers.

Course Outcomes:

Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	understand the basic concepts of social networks	L1, L2, L3
2	understand the fundamental concepts in social network mining	L1, L2, L3
3	understand the modelling and visualization of network	L1, L2, L3
4	understand the concepts of **social network graph analysis**	L1, L2, L3,L4
5	Perform visualization and exploration using Gephi software.	L1, L2, L3,L4
6	understand the **dynamic social networks**	L1,L2

Detailed Syllabus:

Module No.	Introduction	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Introduction to Semantic Web, the Social Web - Social Network analysis, Development of Social Network Analysis – the concepts and measures in network analysis , Blogs and online communities - Web-based networks - Applications of Social Network Analysis. Advantages and disadvantages in social networks.	9	L1, L2, L3

2	**Social Network Mining** Introduction to social network mining. Social network extraction from big data, Various social network mining tasks with real-world examples. Community detection and Shingling algorithm, Social Networks as Graphs. Random graph models, ranking algorithms, Graph and Matrices, Basic measures for individuals and networks,	7	L1,L2, L3
3	**Modelling and visualization of network** Mechanisms : Homophily, Opportunity, and Balance, edges , nodes Analyze a social network by data wrangling and visualizing a network.	7	L1,L2, L3
4	**Social Network Graph Analysis** Graph kernels, Graph classification, mining and outlier detection, centrality measures , network level measures, partitioning of graphs, components and bridges, cliques	7	L1, L2,L3,L4
5	**Gephi** Download and Install Gephi, load network data, manipulate the color, structures and shapes ,get Network-Level Measures, centrality measures,	9	L1, L2, L3,L4
6	**Dynamic Social Networks** Social learning on networks, Information and Biological networks, Various applications of Social Network mining in real world applications, Social Connects: Affiliation and identity	6	L1, L2
	Total Hours	**45**	

Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	Social Network Data Analytics	Charu C. Aggarwal ·	Springer	1st	2011
2	Network Graph Analysis and Visualization with Gephi	Ken Cherven	Packt	1st	2013
3	Social network analysis: A handbook	Scott, J.	Sage	2nd	2007
4	Social Network Analysis,	Knoke	Sage	2nd	2008

Online References:

S. No.	Website Name	URL	Modules Covered
1	towardsdatascience.com	https://towardsdatascience.com/how-to-get-started-with-social-network-analysis-6d527685d374	M6
2	iopscience.iop.org	https://iopscience.iop.org/article/10.1088/1742-6596/1235/1/012111/pdf	M1-M5

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<table>
<tr><td colspan="7">BE Information Technology</td><td colspan="3">B.E. Open Elective SEM: VIII</td></tr>
<tr><td colspan="7">Course Name : Taxation for Engineers</td><td colspan="3">Course Code : OEC-IT 8024</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (20)</td><td>Term Work (20)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>--</td><td>--</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration – 1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: NILL</td></tr>
</table>

Course Objective: This course discusses taxation, its principles, its objectives, and its effects; the nature and purposes of taxation, whether taxes should be classified as direct or indirect. It also instils an awareness in students that taxes constitute significant costs to businesses and households and therefore have a major impact in economic and other decision-making, also these costs are potentially controllable through legitimate tax minimisation strategies. The course also shall enable students to appreciate the wider economic, social, administrative-compliance and political contexts within which taxes are imposed.

Course Outcomes: Upon completion of the course, students will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand the basic principles of taxation in India and the various provisions of Income Tax Act 1961	L2
2	Understand and apply the computation of taxable income under the heads capital gain and other sources	L3
3	Apply the provisions of clubbing of income, set off of losses and deductions permitted under the Income Tax Act, 1961.	L3
4	Analyze the computation of taxable income under the head Salaries, Income from House Property and Profits and Gains of Business or Profession	L4
5	Differentiate between Direct and Indirect Tax	L4
6	Understand the Concept of Service Tax and laws	L2

Detailed Syllabus:

Module No	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Principles of Taxes** Objectives of Taxation, Principles related to taxation system, Characteristics of good tax system, Effects of Taxation on Production, Distribution and Employment, Taxable capacity – Absolute and Relative Capacity, Factors determining Taxable Capacity, The Income tax Act, 1922, Present system of taxation in India - Income Tax Act 1961	08	L1, L2
2	**Introduction to Income tax** Basis of Charge, Rates of Tax, Residential Status of Individual, HUF, Firm, Company, AOP/BOI, Local Authority, Practical problems on determination of residential status and incidence of tax, Scope of total income	07	L1, L2, L3
3	**Incomes Exempt from Tax** Different categories of Exempted Income, Incomes which are neither included in Total Income nor Income Tax is payable, Incomes which are included in Total Income, but no income Tax is payable.	07	L1, L2, L3
4	**Income from Salaries** Basis of Charge, Different Forms of Salary, Treatment of provident fund, Allowances, Perquisites, treatment of other items included in salary, Profit-in-lieu of Salary Gratuity, Pension and Commuted pension, Encashment of earned leave, Retrenchment compensation, Provident Fund – Types of provident fund and tax treatment, Deductions, Computation of Income from Salary.	08	L1, L2, L3, L4
5	**Direct and Indirect Taxes** Classification of Taxes, Meaning of direct tax, Basic Concepts: Assessee, Assessment Year, Previous Year, Person, Income, Gross Total Income, Total Income. Meaning of Indirect Taxes, Features, Advantages, Disadvantages, Distinction between Direct and Indirect Taxes, Central Indirect Tax Laws, Indirect Tax Laws of the States, convergence of indirect taxes, Movement to GST	08	L1, L2, L3, L4
6	**Service Tax** Service Tax Law in India, the concept of 'Negative List', Categorization of Taxable and Tax-free Services, Exemptions and Rebates from Service Tax, Provisions for Rectification of Mistakes and schemes of Assessment	07	L1, L2
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Income Tax	Vinod K. Sinhania & Monica Sinhania	Taxmann Publications Pvt. Ltd	64th	2020-21
2	Taxation Law & Practice	Mehtrotra & Goyal	Sahitya Bhavan Publication	61st	2020
3	Direct Taxes	Lal B.B	Konark Publishing House	30th	2012
4	Indirect Taxes	Datey, V.S	Taxmann Publications Pvt. Ltd	44th	2020
5	Systematic Approach to Income Tax	Girish Ahuja& Ravi Gupta	Bharat Law House Pvt. Ltd	33rd	2014-15
6	Indirect Taxation	Balachandran. V	Sultan Chand & Sons	18th	2019

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<table>
<tr><td colspan="6">BE Information Technology</td><td colspan="4">B.E. Open Elective SEM: VIII</td></tr>
<tr><td colspan="6">Course Name: Product Design and Development</td><td colspan="4">Course Code: OEC-IT 8025</td></tr>
<tr><td colspan="6">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="6">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="6">Hours Per Week</td><td>Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>-</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration – 1.5 Hours
ESE : End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: NILL</td></tr>
</table>

Course Objectives: Course intended to deliver the fundamental knowledge of basic principles involved in design of new product and its development.

Course Outcomes: Upon completion of the course, students will be able to:

SN	Course Outcomes	Cognitive levels as per bloom's Taxonomy
1	Identify design and development process of industrial products, considering Ergonomic requirements.	L1, L2
2	Explain market requirements and manufacturing aspects of industrial design.	L1, L2, L3
3	Identify consumer products, functions and use.	L1, L2, L3
4	Explain aesthetic concept, symmetry.	L1, L2, L3, L4
5	Explain economic considerations, value analysis and cost reduction.	L1, L2
6	Employ standard organization structure, standardization, record keeping.	L1, L2, L4, L5, L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per bloom's Taxonomy
1	**Introduction-Approach to Industrial Design** Approach to industrial product based on idea generation and innovations to meet the needs of the developing society. Design and development process of industrial products, various steps such as creative process involved in idea marketing, designers, mind- criticism, design process, creation. Ergonomics and aesthetic requirements of product design, quality and maintainability consideration in product design, Use of modeling technique, prototype designs, conceptual design.	4	L1, L2
2	**Industrial Product Design** General design situations, setting specifications, requirements and ratings, their importance in the design, Study of market requirements and manufacturing aspects of industrial designs. Aspects of ergonomic design of machine tools, testing equipment, instruments, automobiles, process equipment etc. Convention of style, from and color of industrial design.	8	L1, L2, L3
3	**Design of Consumer Product** Functions and use, standard and legal requirements, body dimensions. Ergonomic considerations, interpretation of information, conversions for style, forms, colors.	8	L1, L2, L3, L4
4	**Aesthetic Concepts** Concept of unity order with variety, concept of purpose, style and environment, Aesthetic expression of symmetry, balance, contrast and continuity, proportion, rhythm, radiation. Form and style of product: visual effect of line and form, mechanics of seeing, psychology of seeing, influence of line and form, Components of style, Basic factors, effect of color on product appearance, color composition, conversion of colors of engineering products.	8	L1, L2, L3
5	**Economic Considerations** Selection of material, Design for production, use of standardization, value analysis and cost reduction, maintenance aspects in design.	10	L1, L2, L3, L4
6	**Design Organization** Organization Structure, Designer position, Drawing office procedure, Standardization, record keeping, legal procedure of Design patents.	7	L1, L2, L4, L5,L6
	Total	45	

Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	Industrial Design for Engineers	W. H. Mayall	London Hiffee books Ltd	First	1967
2	Problems of Product Design and Development	Hearn Buck	Pergamon Press	First	-
3	Industrial Designs in Engineering	Charles H. Fluerichem	-	First	-
4	Material of Invention: Materials and Design	Ezio Manzini	The MIT Press	First	1989
5	The Science of Engineering Design	Percy H. Hill	Holt, Rinehart and Winston Publication	First	1970

Online References:

Sr.No.	Website Name	URL	Modules Covered
1	https://nptel.ac.in	https://nptel.ac.in/courses	M1-M6

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Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

<table>
<tr><td colspan="5">B.E. Course</td><td colspan="4">B.E. Open Elective SEM: VIII</td></tr>
<tr><td colspan="5">Course Name: Development Engineering</td><td colspan="4">Course Code: OEC- IT 8026</td></tr>
<tr><td colspan="4">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="4">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
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<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="9">IA: In-Semester Assessment- Paper Duration-1.5 Hours
ESE : End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="9">Prerequisite: QSEV, Tender & Contract</td></tr>
</table>

Course Objectives: Students will understand the characteristics of rural Society and the Scope, nature and constraints of rural Development, also provide an exposure to implications of 73rd CAA on Planning, Development and Governance of Rural Areas, exploration of human values, which go into making a 'good' human being, a 'good' professional, a 'good' society and a 'good life' in the context of work life and the personal life of modern Indian professionals and get familiarize with the Nature and Type of Human Values relevant to Planning Institutions.

Course Outcomes:

SN	Course Outcomes	Cognitive Levels as per Bloom's Taxonomy
1	Demonstrate understanding of knowledge for Rural Development.	L1, L2, L3, L4
2	Prepare solutions for Management Issues.	L1, L2, L3, L4
3	Take up Initiatives and design Strategies to complete the task	L1, L2, L3, L4
4	Develop acumen for higher education and research.	L1, L2, L3, L4
5	Demonstrate the art of working in group of different nature	L1, L2, L3, L4
6	Develop confidence to take up rural project activities independently	L1, L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive Levels as per Bloom's Taxonomy
1	Introduction to Rural Development Meaning, nature and scope of development; Nature of rural society in India; Hierarchy of settlements; Social, economic and ecological constraints for rural development. Roots of Rural Development in India Rural reconstruction and Sarvodaya programme before independence; Impact of voluntary effort and Sarvodaya Movement on rural development; Constitutional direction, directive principles; Panchayati Raj - beginning of planning and community development; National extension services.	06	L1, L2, L3, L4
2	Post-Independence rural Development Balwant Rai Mehta Committee - three tier system of rural local Government; Need and scope for people's participation and Panchayati Raj; Ashok Mehta Committee - linkage between Panchayati Raj, participation and rural development.	09	L1, L2, L3, L4
3	Rural Development Initiatives in Five Year Plans Five Year Plans and Rural Development; Planning process at National, State, Regional and District levels; Planning, development, implementing and monitoring organizations and agencies; Urban and rural interface - integrated approach and local plans; Development initiatives and their convergence; Special component plan and sub-plan for the weaker section; Micro-eco zones; Data base for local planning; Need for decentralized planning; Sustainable rural development	12	L1, L2, L3, L4
4	Post 73rd Amendment Scenario 73rd Constitution Amendment Act, including - XI schedule, devolution of powers, functions and finance; Panchayati Raj institutions - organizational linkages; Recent changes in rural local planning; Gram Sabha - revitalized Panchayati Raj; Institutionalization; resource mapping, resource mobilization including social mobilization; Information Technology and rural planning; Need for further amendments.	06	L1, L2, L3, L4

5	Values and Science and Technology Material development and its values; the challenge of science and technology; Values in planning profession, research and education Types of Values Psychological values — integrated personality; mental health; Societal values — the modern search for a good society; justice, democracy, rule of law, values in the Indian constitution; Aesthetic values — perception and enjoyment of beauty; Moral and ethical values; nature of moral judgment; Spiritual values; different concepts; secular spirituality; Relative and absolute values; Human values— humanism and human values; human rights; human values as freedom, creativity, love and wisdom	07	L1, L2, L3, L4
6	Ethics Canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility; Work ethics; Professional ethics; Ethics in planning profession, research and education	05	L1, L2, L3, L4
	TOTAL	**45**	

Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	ITPI, Village Planning and Rural Development,	ITPI,	New Delhi	First	-
2	Thooyavan, K.R. Human Settlements:	A 2005 MA Publication, Chennai	A 2005 MA Publication, Chennai	First	-
3	GoI, Constitution (73rdGoI, New Delhi Amendment) Act,	GoI, New Delhi	GoI, New Delhi	First	-
4	Planning Commission, Five Year Plans, Planning Commission	Planning Commission, Five Year Plans, Planning Commission	Planning Commission	First	-
5	Planning Commission, Manual of Integrated District Planning, 2006,	Planning Commission New Delhi	Planning Commission New Delhi	First	-
6	Planning Guide to Beginners	Planning Guide to Beginners	Planning Guide to Beginners	First	-
7	The Urban Complex, Doubleday	Weaver, R.C.,	-	First	-
8	Ethics in Planning, American Planning Association,	Farmer, W.P. et al	Washington	Second	
9	Normative Ethics in Planning, Journal of Planning Literature	How, E.,	Vol.5, No.2, pp. 123-150	Second	-
10	Implications for Planning Theory and Ethics, Planning Theory and Practice,	Watson, V. Conflicting Rationalities:	Vol. 4, No.4, pp.395 – 407	Second	-

B.E. Semester – VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

B.E.(Information Technology)							**B.E.(SEM :** VIII)		
Course Name : Project-II							**Course Code :** PROJ IT 801		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/ Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
--	-	12	12	06	--	--	100	50	**150**
IA: In-Semester Assessment **ESE : End Semester Examination** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).									
Prerequisite: Knowledge of Software development lifecycle									

Course Objectives: The course intends to deliver the fundamentals of problems and challenges that need IT based solutions. Students will be introduced to the vast array of literature available of the various research challenges in the field of IT. Also To create awareness among the students of the characteristics of several domain areas where IT can be effectively used and to improve the team building, communication and management skills of the students.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Discover potential research areas in the field of IT	L1, L2, L3,L4
2	Conduct a survey of several available literature in the preferred field of study	L1, L2, L3
3	Compare and contrast the several existing solutions for research challenge	L1, L2, L3,L4,L5
4	Demonstrate an ability to work in teams and manage the conduct of the research study	L1, L2, L3,L4
5	Formulate and propose a plan for creating a solution for the research plan identified	L1, L2, L3,L4
6	To report and present the findings of the study conducted in the preferred domain	L1, L2, L3,L4

Guidelines:

1. The project work is to be conducted by a group of three students
2. Each group will be associated with a project mentor/guide. The group should meet with the project Mentor/guide periodically and record of the meetings and work discussed must be documented.
3. Department has to allocate 1 day in VII semester and 2 day in VIII semester every week.
4. Students will do literature survey in Sem VI or Sem VII.
5. Students will do design, implementation and coding in Sem VII.
6. Each group along with its guide/mentor shall identify a potential research area/problem domain, on which the study is to be conducted.

7. Each team will do a rigorous literature survey of the problem domain by reading and understanding at

least 3-5 research papers from current good quality national/international journals/conferences. (Papers selected must be indexed by Scopus/IEEE/Springer/ACM etc.). The list of papers surveyed must be clearly documented.

8. The project assessment for term work will be done at least two times at department level by giving presentation to panel members which consist of at least three (3) members as internal examiners (including the project guide/mentor) appointed by the Head of the department of respective Programme.
9. A report is to be prepared summarizing the findings of the literature survey. A comparative evaluation of the different techniques surveyed is also to be done.
10. Students will do testing and analyze in Sem VIII
11. Teams must analyze all the results obtained by comparing with other standard techniques.
12. Every team must publish their work in national / international conference/journals (if possible publish in Scopus indexed journals).
13. Teams can go for patenting/Copyright of their respective projects if the work is found to be unique.
14. There can be provision for converting project to product to startup.

B.E. Semester – VIII

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<table>
<tr><td colspan="5">B.E.(Information Technology)</td><td colspan="3">B.E. SEM: VIII</td></tr>
<tr><td colspan="5">Course Name: Summer Internship</td><td colspan="3">Course Code SI-IT801</td></tr>
<tr><td colspan="5" rowspan="2">Contact Hrs. during Semester Break/ End of Semester (Between 21st and 25th Week)</td><td colspan="3">Assessment/Evaluation Scheme</td></tr>
<tr><td>Presentation</td><td>Report</td><td>Non-Grant Term work based on Presentation and Report</td></tr>
<tr><td>Theory</td><td>AC</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>AC</td><td>AC</td><td>TW</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>120 *</td><td>3</td><td>-</td><td>-</td><td>50</td></tr>
<tr><td colspan="8">AC- Activity evaluation TW – Term Work Examination

#As per AICTE, Students has to earn 100 Points by participating in 400 Hrs. of activities during 4 years of Engineering. After Completing 52 hrs. of Activities, Students can earn 13 Points. This Points will not be reflected in Grade Card. Separate transcript will be issued to students after completion of Final Year.

*Total hrs. mentioned should be completed till end of Semester 8. Credits will be awarded at the end of 8th Semester and will be reflected in the Grade Card of 8th Semester. Student will submit a report to earn termwork marks in internship.</td></tr>
<tr><td colspan="8">Prerequisite: Fundamental knowledge of Information Technology related tools</td></tr>
</table>

Course Objectives:

To get industry like exposure in the college laboratories by carrying out projects using subject studied till 8Th semester. Also design innovative techniques / methods to develop the products. To gain knowledge of marketing and publicizing products developed.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To apply subject's knowledge in the college laboratories for carrying out projects	L1, L2,L3
2	Able to developed innovative techniques / methods to develop the products	L1, L2,L3
3	Able to do marketing and publicity of products developed	L1, L2,L3

Detailed Syllabus:

Module No.	Topics	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Program Specific Internship** Training and certification on emerging technologies in domains offered by Department of Computer Engineering Applying classroom and laboratory knowledge to design , develop and deploy the products	L1, L2, L3
2	**Inter disciplinary Internship** • To explore and understand issues and challenges in the other disciplines (E&TC, ELEX, MECH and CIVIL) • Design , develop and deploy cost effective products using multidisciplinary approach	L1, L2, L3
3	**Industry Specific Internship** • To explore and understand issues and challenges in industry • Developing solutions for industry specific problems • Design , develop and deploy products for startup and SMEs	L1, L2, L3
4	**Interpersonal Internship** • To develop interpersonal skills such as leadership, marketing ,publicity and corporate ethics and communication • To get competence in problem solving , presentation , negotiation skills	L1, L2, L3
5	**Social Internship** • Identify and study different real life issues in the society • Identify societal problems and provide engineering solutions to solve these problems	L1, L2, L3
6	**Academic Internship** • Study report preparation, preparation of presentations, copy table book preparation , business proposal and IPR • Capture aspirations & expectations through interviews of students. • Ways to connect research in technical institutes with industry. • Taking inputs from self, local stakeholders and global stake holders which will help to develop process with comparative and competitive study.	L1, L2, L3

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	The Ultimate Guide to Internships: 100 Steps to Get a Great Internship and Thrive in It (Ultimate Guides)	Eric Woodard	Allworth	First	2015

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.letsintern.com/	https://www.letsintern.com/internships/summer-internships	M1-M6

2	https://codegnan.com	https://codegnan.com/blog/benefits-of-internships-and-importance	M1-M6
3	https://www.honorsociety.org	https://www.honorsociety.org/articles?category=internships	M1-M6

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<table>
<tr><td colspan="7">BE Information Technology</td><td colspan="3">B.E. SEM: VIII</td></tr>
<tr><td colspan="7">Course Name: Professional Skills VIII (LaTex)</td><td colspan="3">Course Code: HSD –ITPS 801</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Presentation (50)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>AC</td><td>AC</td><td rowspan="2">75</td></tr>
<tr><td>15</td><td>-</td><td>30</td><td>45</td><td>2</td><td>_</td><td>_</td><td>50</td><td>25</td></tr>
<tr><td colspan="10">AC= Activity Evaluation
Total weightage of marks for continuous evaluation of Term Work/ Report : Formative (40%) , timely completion of practical (40%) and Attendance /Learning Attitude (20%)</td></tr>
<tr><td colspan="10">Prerequisite: MS-Word</td></tr>
</table>

Course Objective: This course will help to create understanding of the LaTeX To understand the fundamentals of Scilab and Utilization Development of Proficiency in English and Communication Skills.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand how to Download and install a comprehensive LATEX distribution	L1,L2,L3
2	Review and Create basic types of LATEX documents	L1,L2,L3
3	Understanding how to Import graphics	L1,L2,L3,L4
4	Build a documents using Listing content and references	L1,L2,L3,L4
5	Build large documents with all futures of LATEX	L1,L2,L3,L4,L5,L6
6	Understand how to create professional presentations using LATEX	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction**	2	L1,L2,L3
	Introduction to LaTeX, installation, and different IDEs. Document creation using LaTeX, organizes content into sections using article and book class of LaTeX.		
2	**Styling Pages**		
	Examines packages, formats the page by setting margins, customizing header and footer, changing the page orientation, dividing the document into multiple columns. Reading different types of error messages.	3	L1,L2,L3
3	**Formatting Content**	3	L1,L2,L3,,L4
	Formatting text (styles, size, alignment), adding colors to text and entire page, bullets and numbered items. Process of writing complex mathematics.		
4	**Tables and Images**	3	L1,L2,L3,l4
	Creating basic tables, adding simple and dashed borders, merging rows and columns, and handling situations with a table exceeds the size of a page. Add an image, explore different properties like rotate, scale, etc.		
5	**Referencing and Indexing**	2	L1,L2,L3,L4,L5, L6
	Add cross-referencing (refer to sections, table, images), add bibliography (references), and create back index.		
6	**Presentation using Beamer**	2	L1,L2,L3,L4,L5, L6
	Introduction to creating slides, adding frames, dividing the slide into multiple columns, adding different blocks, etc.		
	Total Hours	**15**	

Suggested Practical List:

Sr No.	Type of experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	Basic Experiment	Installation of the software LaTeX	2	L1, L, L3,L4
2		Examines and understand packages, formats the page by setting margins, customizing header and footer, changing the page orientation, dividing the document into multiple columns.	3	L1, L2, L3,L4
3	Design Experiment	Create template using Latex compilation Basic Syntex, Writing equations, Matrix, Tables	3	L1, L2, L3,L4
4		Create Page Layout with Titles and Abstract Chapters	2	L1, L2, L3,L4
5		Create List making environments: Table of contents, Generating new commands, Figure handling numbering, List of figures, List of tables, Generating index.	3	L1, L2, L3,L4
6		Create template with Sections	2	L1, L2, L3,L4
7	Advance Experiment	Create template with References, Equation references, citation.	3	L1, L2, L3,L4
8		Create a template by Adding an image, explore different properties like rotate, scale, etc.	3	L1, L2, L3,L4
9		create slides, adding frames, dividing the slide into multiple columns, adding different blocks, etc.	3	L1, L2, L3,L4
10	Mini Project	Mini Project	6	L1, L2, L3,L4,L5,L6
		Total	30	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	A Student's Guide to the Study, Practice, and Tools of Modern Mathematics	Martin J. Erickson and Donald	CRC Press, Boca Raton	-	2011
2	LATEX: A Document Preparation System, User's Guide and Reference Manual	L. Lamport	Addison-Wesley, New York	second	1994

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://spoken-tutorial.org	https://spoken-tutorial.org/tutorial-search/?search_foss=LaTeX&search_language=English	M1,M2,M3, M4,M5
2	https://www.edx.org	https://www.edx.org/course/latex-for-students-engineers-and-scientists-2	M1,M2,M3, M4,M5,M6

B.E. Semester –VIII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)
TCET Autonomy Scheme (w.e.f. A.Y. 2021-22)

BE Information Technology					**SEM: VIII**		
Course Name: Research Based Learning IV					**Course Code:** HSD –ITRBL801		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**		
Modes of Teaching / Learning / Weightage					**Assessment/Evaluation Scheme**		
Total Hours Per Week					**Presentation**	**Report**	**Term Work**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**AC**	**AC**	**TW**
-	-	30	30	1	25	25	50
Audit course evaluated by Teacher Guardian							
Mid Semester Assessment for Term work will be on continuous basis							
Prerequisite: Subject knowledge, Domain knowledge							

Course Objectives: This course is focused to engage the learner in research using critical thinking, problem solving, coding and technical writing related to upcoming latest technologies.

Course Outcomes: Upon completion of the course students will be able to:

S.N.	Course Outcome	Cognitive level attainment as per revised Bloom Taxonomy
1	Student will be aware of latest technologies developments in their discipline in a competitive environment.	L1, L2
2	Student will be able to create new idea for problem solving related to industry or societal issues.	L1, L2, L3,L4
3	Students will be to develop the code for given problem definition in a competitive environment.	L1, L2, L3,L4,l5,L6
4	Students will be write a research paper and understand technical writing.	L1, L2, L3,L4,l5

Detailed Syllabus:

Module No.	Topics	Cognitive level attainment as per revised Bloom Taxonomy
1	**Participation in IPR Awareness seminar** Participation in IPR awareness seminar.	L1, L2, L3
2	**Industry linkage / visit related to product and domain/Establish start up** I. **Proto type development**: Introduction and importance of prototype development. , Steps for Idea generation to implementation. Transforming Idea into project with implementation II. Presentations by students and assessment, Experience sharing by entrepreneurs or Hackathon Winners. **Presentation and evaluation**	L1, L2, L3,L4
3	**Building Competitive Attitude**	L1, L2, L3,L4

	II. **Participation in project competitions/coding competitions /Working for research grant/consultancy: a)**Participating at institute /national level /university level/ conference /participate in competitions. b) Participation in funded project/consultancy projects II. Mock Evaluation/Experience sharing by good coders **competition and evaluation**	
4	**Research Paper Publication** I. **Introduction to Research paper writing:** Introduction to research paper writing, review of literature based on idea and developed prototype. II. **Publishing:** Identification of appropriate journal or conference at national level /university level/conference for submission and Preparation of a review paper. **Evaluation of research review paper.**	L1, L2, L3,L4,L5

References:

Sr. No.	Title	Authors	Publisher	Edition	Year
3.	Guide to Competitive Programming: Learning and Improving Algorithms Through Contests	Antti Laaksonen	Springer	Kindle	2018
4.	Writing Research Papers: A Complete Guide	James D. Lester	Longman	10th	2001
3.	Creativity in Product Innovation	Jacob Goldenberg	Cambridge University Press	Kindle	2002

Online References:

Sr. No.	Website Name	URL	Modules Covered
5.	https://www.geeksforgeeks.org	https://www.geeksforgeeks.org/tag/c-quiz-references/	M1
6.	https://www.researchgate.net	https://www.researchgate.net/publication/224372998_Idea_Generation_Techniques_among_Creative_Professionals	M2
7.	https://discuss.codechef.com	https://discuss.codechef.com/t/programming-contest-detailed-syllabus-along-with-example-problems/17791	M3
8.	https://www.statpac.com	https://www.statpac.com/online-software-manual/Basic-Research-Concepts.htm	M4
9.	https://www.slideshare.net	https://www.slideshare.net/AsirJohnSamuel/1introduction-to-research-methodology?next_slideshow=1	M4